
4. PROGRAM IMPLEMENTATION

Phase II of the CALFED Bay-Delta Program will culminate with the Federal Record of Decision and the State Certification of the Final Programmatic EIS/EIR (expected to be completed in September 2000). At that time, Phase III of the CALFED Bay-Delta Program will begin implementation of the Preferred Program Alternative. Phase III is expected to extend 30 years or more.

Program implementation during Phase III will be guided by the Implementation Plan. The plan focuses on the early years of implementation when needed actions are better known but also reflects a long-term vision for continuing implementation over the next several decades. This chapter summarizes the Implementation Plan, and contains the following parts:

- **Stage 1 Actions** - A list of proposed actions for the first seven years of implementation following the Record of Decision and Certification of the EIS/EIR.
- **Governance Plan** - Describes Program implementation functions and recommends an interim and long-term governance structure for CALFED.
- **Financing Plan** - Plan for funding the implementation of the preferred alternative including financing principles, cost allocation and cost sharing considerations, and Program element cost estimates.
- **Restoration Coordination** - Describes early implementation of ecosystem restoration actions. Actions are selected for their benefits to the long-term program regardless of the final configuration of the Preferred Program Alternative.
- **Comprehensive Monitoring, Assessment and Research Program** - Plan for monitoring and research that provides the data and necessary information to evaluate the performance of completed actions for use in supporting the adaptive management of future actions.
- **Adaptive Management** - Plan to use the monitoring and research to adjust future implementation as more is learned about the system and how it responds to restoration efforts.

4.1 Stage 1 Actions

Stage 1 is defined as the seven year period commencing with the final decision on the Programmatic EIS/EIR. Agreement on Stage 1 actions is only one part of the decision for a Preferred Program Alternative, but it is important that these actions achieve balanced benefits and lay a solid foundation for successful implementation of the Program.

The following pages provide more detail on potential actions for Stage 1. To the extent that such actions require additional authorizing legislation, such authorization will be developed and pursued in cooperation with stakeholders. The Stage 1 actions are subject to revision, including modification, deletion, or addition of individual actions, based upon information developed during program implementation; available resources, including funding and personnel; and logistical considerations.

The outcome of, and certain sites for, Stage 1 decisions will not be known until additional information, including analysis of alternatives and need for mitigation, is available and until the options to carry out these Stage 1 proposals have undergone environmental review. Consequently, the outcome could be altered as a result of that second tier environmental review and mitigation measures imposed as a part of those actions. However, where the impacts from the actions in Stage 1 have been included in the Programmatic EIS/EIR, the subsequent environmental documents can tier off the Programmatic document for cumulative and long-range impacts of the programmatic decision.

Each potential action in the following Stage 1 list includes an estimate (in parentheses) of when the action may occur within Stage 1. For example, "(yr 1)" indicates the action is expected to occur in the first year following the final decision on the Programmatic EIS/EIR.

With extensive input from CALFED agencies and stakeholders, CALFED has begun work on developing a linked set of high priority Stage 1 actions that provide regional and programmatic balance, as described below. Linking the actions would help assure that they all move forward together. These may be linked within the same project EIS/EIR, tied by contractual documents, bond language, appropriation legislation, or other means.

The State and Federal fish and wildlife agencies charged with making the programmatic determinations for the CALFED Program pursuant to federal ESA, CESA, and the NCCPA will be describing program performance measures or milestones for the Ecosystem Restoration Program (ERP) and MSCS. The milestones will be derived from the ERP targets and programmatic actions and MSCS conservation measures. These milestones will be an integral component of the federal biological opinions and NCCPA authorization.

Levees

The focus of the long-term levee protection element of the Program is to reduce the risk to land use and associated economic activities, water supply, infrastructure, and the ecosystem from catastrophic breaching of Delta levees. The Levees program includes the Delta and Suisun Marsh. The level of flood protection to be provided by Suisun Marsh levees will be defined

during Stage 1. Levee protection is an ongoing effort which builds on the successes of ongoing programs and consists of:

- *Base-level funding to participating local agencies;*
- *Funding of special improvement projects for habitat and levee stabilization to augment the base-level funding based on statewide benefits;*
- *Implementation of subsidence control measures to improve levee integrity;*
- *Implementation of an emergency management and response plan to more effectively plan for and deal with potential levee disasters; and*
- *Development of a risk assessment and implementation of a risk management strategy.*

The first stage continues the decades-long process to improve reliability of Delta levees.

1. Initiate the Levee Program Coordination Group. Develop and implement an outreach, coordination, and partnering program with local landowners including individuals, cities, counties, reclamation districts, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to assure participation in planning, design, implementation, and management of levee projects (yr 1).
2. Obtain short-term federal and State funding authority as a bridge between the existing Delta Flood Protection Authority (AB 360) and long-term levee funding (yr 1-5).
3. Obtain long-term federal and state funding authority (yr 1-7).
4. Conduct project level environmental documentation and obtain appropriate permits for each bundle of Stage 1 actions (yr 1-7).
5. Implement demonstration projects for levee designs, construction techniques, sources of material, reuse of dredged material, and maintenance techniques that maximize ecosystem benefits while still protecting lands behind levees. Give priority to those levee projects which include both short (i.e., construction) and long-term (i.e., maintenance and design) ecosystem benefits, and which will provide increased information (yr 1-7).
6. Adaptively coordinate Delta levee improvements with ecosystem improvements by incorporating successful techniques for restoring, enhancing, or protecting ecosystem values developed by levee habitat demonstration projects or ecosystem restoration projects into levee projects. Continue to develop techniques as major levee projects are implemented (yr 1-7).
7. Fund levee improvements up to PL84-99 in first stage; e.g., proportionally distribute available funds to entities making application for cost sharing of Delta levee improvements (yr 1-7).

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8. Further improve levees which have significant statewide benefits in Stage 1; e.g., statewide benefits to water quality, highways, etc. (yr 1-7).
 9. Coordinate Delta levee improvements with Stage 1 water conveyance, water quality improvements, and with potential conveyance improvements in subsequent stages (yr 1-7).
 10. Enhance existing emergency response plans; e.g., establish a revolving fund, refine command and control protocol, stockpile flood fighting supplies, establish standardized contracts for flood fighting and recovery operations, outline environmental considerations during emergencies (yr 1-7).
 11. Implement current Best Management Practices (BMPs) to correct subsidence effects on levees. Assist CALFED Science Program activities to quantify the effect and extent of inner-island subsidence and its linkages to all CALFED objectives (yr 1-7).
 12. Develop BMPs for the reuse of dredge materials (yr 1).
 13. Institute a program for using Bay and Delta dredge material to repair Delta levees and restore Delta habitat (yr 1-7).
 14. Complete total risk assessment for Delta levees and develop and begin implementation of risk management options as appropriate to mitigate potential consequences (yr 1-7).
 15. Complete the evaluation of the best method for addressing the Suisun Marsh levee system and begin implementation (yr 1-2).

Water Quality

The water quality program will consist of a wide variety of actions to provide good water quality for environmental, agricultural, drinking water, industrial, and recreational beneficial uses of water. Water quality actions are a combination of source protection and improvement measures, pilot facilities for treatment and control, operational measures using existing and new storage, research and studies, water exchanges, and conveyance improvements. The majority of the water quality actions rely on comprehensive monitoring, assessment, and research to improve understanding of effective water quality management and on the control of water quality problems at their sources. The Stage 1 water quality efforts focus on reducing constituents contributing toxicity to the ecosystem and affecting water users; reducing total organic carbon (TOC) loading, salinity, nutrients, and pathogens that degrade drinking water quality, and reducing oxygen depleting substances and sediment loads that degrade ecological water and habitat quality. CALFED is pursuing Stage 1 actions to protect public health through continuous improvements in drinking water quality. The Stage 1 actions also include studies and investigations that will contribute to an assessment and decision on the need for additional conveyance actions and/or other means of providing better quality source water.

General Water Quality Actions

1. Prepare project level environmental documentation and permitting as needed (yr 1-7).
2. Coordinate with other CALFED program elements to ensure that in-Delta modifications maximize potential for Delta water quality improvements (yr 1-7).
3. Continue to clarify use of and fine-tune water quality performance targets and goals (yr 1-7).

Environmental Water Quality

4. Conduct the following mercury evaluation and abatement work:
 - Cache Creek*
 - Support risk appraisal and advisory for human health impacts of mercury (yr 1-5).
 - Support development and implementation of total maximum daily loads (TMDL) for mercury (yr 1-7).
 - Determine bioaccumulation effects in creek and Delta (yr 1-4).
 - Source, transport, inventory, mapping, and speciation of mercury (yr 1-7).
 - Information Management/Public Outreach (yr 5-7).
 - Participate in Stage 1 remediation (drainage control) of mercury mines as appropriate (yr 1-5).
 - Investigate sources of high levels of bioavailable mercury (yr 4-7).
 - Sacramento River*
 - Investigate sources of high levels of bioavailable mercury, inventory, map, and refine other models (yr 1-5).
 - Participate in remedial activities (yr 3-5).
 - Delta*
 - Research methylization (part of bioaccumulation) process in Delta (yr 1-2).
 - Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (yr 1-7).
 - Determine potential impact of ecosystem restoration work on methyl mercury levels in lower and higher trophic level organisms (yr 1-5).
5. Conduct the following pesticide work:
 - Support development and implementation of a TMDL for diazinon (yr 1-7).
 - Support development of BMPs for dormant spray and household uses (yr 1-3).
 - Study the ecological significance of pesticide discharges (yr 1-3).
 - Support implementation of BMPs (yr 2-7).

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- Monitor to determine effectiveness of BMP implementation (yr 4-7).
 6. Conduct the following trace metals work:
 - Determine spatial and temporal extent of metal pollution (yr 3-7).
 - Determine ecological significance and extent of copper contamination (yr 2-4).
 - Review impacts of other metals such as cadmium, zinc, and chromium (yr 1).
 - Participate in Brake Pad Partnership (as a stakeholder) to reduce introduction of copper (yr 1-7).
 - Partner with municipalities on evaluation and implementation of storm water control facilities (yr 2-5).
 - Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (yr 2-7).
 7. Conduct the following selenium work:
 - Conduct selenium research to fill data gaps in order to refine regulatory goals of source control actions; determine bioavailability of selenium under several scenarios (yr 1-5).
 - Evaluate and, if appropriate, implement real-time management of selenium discharges (yr 1-7).
 - Expand and implement source control, treatment, and reuse programs (yr 1-7).
 - Coordinate with other programs; e. g., recommendations of San Joaquin Valley Drainage Implementation Program, Central Valley Project Improvement Act (CVPIA) for retirement of lands with drainage problems that are not subject to correction in other ways; Central Valley Regional Water Quality Control Board (RWQCB) water quality actions (selenium TMDL); and Grasslands Bypass project (yr 1-7).
 8. Conduct the following sediment reduction work/organochlorine pesticides:
 - Participate in implementation of U. S. Department of Agriculture (USDA) sediment reduction program (Organochlorine pesticides are also reduced as they are tightly bound with sediment.) (yr 1-7).
 - Promote sediment reduction in construction areas and urban stormwater, and other specific sites (yr 1-7).
 - Implement stream restoration and revegetation work (yr 4-7).
 - Quantify and determine ecological impacts of sediments in target watersheds, implement corrective actions (yr 4-7).
 - Coordinate with ERP on sediment needs (yr 1-3).
 9. Conduct the following work addressing dissolved oxygen (DO) and oxygen depleting substances (including nutrients):
 - Define corrective measures for DO sag (yr 1-7).

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- Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (yr 1-7).
 - Develop inter-substrate DO testing in conjunction with ERP (yr 2-4).
 - Study nutrient effects on beneficial uses (yr 4-7).
 - Develop, implement, and support measures to reduce pollutant (oxygen depleting substances, nutrients, and ammonia) discharges from concentrated animal feeding operations (yr 1-7).
 - Support finalization of investigation of methods to reduce constituent that cause low DO for inclusion in the TMDL recommendation by the Central Valley RWQCB (yr 1-2).
 - Support finalization of Basin Plan Amendment and TMDL for constituents that cause low DO in the San Joaquin River (yr 2).
 - Support implementation of appropriate source and other controls as recommended in the TMDL (yr 3).
10. Conduct the following toxicity of unknown origin work:
- Participate in identifying toxicity of unknown origin and addressing as appropriate (yr 1-7).

Drinking Water Quality Actions

11. Actions specific to drinking water improvements:
- Work cooperatively with Bay Area water suppliers as they develop a Bay Area Blending/Exchange Project (yr 1-7).
 - Address drainage problems in the San Joaquin Valley to improve downstream water quality (yr 1-7+).
 - Implement source controls in the Delta and its tributaries (yr 1-7+).
 - Support the ongoing efforts of the Delta Drinking Water Council (yr 1-7+).
 - Facilitate water quality exchanges and similar programs to make high quality Sierra water in the eastern San Joaquin Valley available to urban Southern California interests (yr 1-7).
 - Invest in Treatment Technology Demonstrations (yr 1-7).
 - Control runoff into the California Aqueduct and other similar conveyances (yr 1-7+).
 - Address water quality problems at the North Bay Aqueduct (yr 1-7+).
 - Conduct comprehensive evaluations, pilot programs, and full scale actions to reduce TOC contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvements (yr 1-7).
 - Improve DO concentrations in the San Joaquin River near Stockton (yr 1-3).

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- Study recirculation of export water to reduce salinity and improve DO in the San Joaquin River. If feasible, and consistent with ERP goals and objectives, implement a pilot program (yr 1-4).

Ecosystem Restoration

The CALFED ERP is designed to maintain, improve, and increase aquatic and terrestrial habitats and improve ecological functions in the Bay-Delta to support sustainable populations of diverse and valuable plant and animal species. The ERP is also designed to achieve recovery of listed species dependent on the Delta and Suisun Bay as identified in the MSCS, and support the recovery of listed species in San Francisco Bay and in the watershed above the estuary. A foundation of this program element is the restoration of ecological processes associated with stream flow, stream channels, watersheds, and flood plains. Implementation of the ERP over the 30 year implementation period will be guided through an ecosystem-based, adaptive management approach. ERP goals and objectives for ecosystem, habitat, and species rehabilitation are designed to produce measurable and progressive improvements to the Bay-Delta ecosystem resulting in a high level of ecosystem health and species recovery that exceeds existing regulatory requirements. The Stage 1 restoration efforts are structured to accomplish significant improvement in Bay-Delta ecological health through a large scale adaptive management approach in which the actions inform management decisions in later stages of implementation. All Stage 1 actions will undergo an appropriate level of environmental review, will be subject to various permit requirements, and will be dependent on budget allocations.

Success of ERP Stage 1 actions is also critically dependent on other program elements, including water quality improvement actions throughout the Bay-Delta watershed, levee system integrity actions, and integration with a watershed management strategy and a water transfers market. To ensure success, CALFED will be facilitating the development of a single blueprint or coordinated plan for environmental restoration throughout the CALFED focus area. The general priorities for restoration activities will be first on existing public lands as appropriate, second to work with landowners in volunteer efforts to achieve habitat goals including the acquisition of easements, third a combination of fee and easement acquisition, and fourth on acquisition of fee title as necessary to achieve program objectives. Acquisition will be on a willing seller basis and with emphasis on local coordination and partnerships and include appropriate mitigation for agricultural resource impacts. The intent is to maximize habitat benefits while minimizing land use impacts.

1. Develop and implement an outreach, coordination, and partnering program with local landowners and individuals, cities, counties, reclamation districts, the Delta Protection Commission, resource conservation districts, water authorities, irrigation districts, farm bureaus, other interest groups, and the general public to

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- assure participation in planning design, implementation, and management of ecosystem restoration projects (yr 1-7).
2. Conduct project level environmental documentation and permitting as needed for each Stage 1 action (yr 1-7).
 3. Full coordination and funding partnerships with other ongoing activities which address ecosystem restoration in the Bay-Delta system; e. g., CVPIA, Four Pumps Agreement, Non-native Invasive Species Task Force, etc. (yr 1-7).
 4. Implement habitat restoration in the San Francisco Bay, Sacramento-San Joaquin Delta, Suisun Bay and Marsh, and Yolo Bypass to improve ecological function and facilitate recovery of endangered species consistent with the goals of the ERP Strategic Plan and MSCS (yr 1-7). Habitat restoration efforts in Stage 1 will: restore 2,000 acres of tidal perennial aquatic habitat, restore 200 acres of deep open water nontidal perennial aquatic habitat, restore 300 acres of shallow open water nontidal perennial aquatic habitat, enhance and restore 50 miles of Delta slough habitat, enhance and restore 50 to 200 acres of midchannel islands, restore 8,000 to 12,000 acres of fresh emergent (tidal) wetlands, restore 1,200 to 2,300 acres of saline emergent (tidal) wetlands, restore 4,000 acres of fresh emergent (non-tidal) wetlands, restore 25 miles of riparian and riverine aquatic habitat, restore 1,000 to 2,000 acres of perennial grassland, restore 7,000 to 10,000 acres of seasonal wetlands, and establish 8,000 to 12,000 acres of wildlife friendly agricultural habitat. Focus early restoration on the Yolo Bypass, Mokelumne/Cosumnes, and San Joaquin habitat corridors. This reflects approximately one-fourth of the acreage identified in the ERP to be restored during the 30-year implementation period. These actions are key to making progress towards achieving the goals in the ERP and the MSCS. Consistent with the CALFED solution principle to reduce conflicts in the system and ERP Goal # 1, *At-Risk Species*, highest priority will be placed on actions that restore populations of at-risk species that most strongly affect the operations of the SWP/CVP diversions in the south Delta. The results of these actions will begin to inform the adaptive management process and will help guide larger scale habitat restoration in future stages.
 5. Implement large-scale, restoration projects on select rivers (possibly Clear Creek, Deer Creek, and the Tuolumne River) that would include implementation of all long-term restoration measures in coordination with the watershed management common program and monitoring of subsequent ecosystem responses to learn information necessary for making decisions about implementing similar restorations in later stages (yr 1-7).
 6. Implement an Environmental Water Account (EWA) that acquires water for critical ecosystem and species recovery needs, substantially through voluntary purchases in the water transfer market in its first few years and developing additional assets over time (yr 1-4).

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7. Pursue full implementation of ERP upstream flow targets through voluntary purchases of at least 100,000 acre-feet by the end of Stage 1. Evaluate how the ERP water acquisitions and EWA water acquisitions will be integrated most effectively (yr 1-7).
 8. Complete targeted research and scientific evaluations needed to resolve the high priority issues and the twelve uncertainties identified in the ERP Strategic Plan (e.g., instream flow, exotic organisms, and Bay Delta food web dynamics) to provide direction for implementing the adaptive management process and information necessary for making critical decisions in later stages (yr 1-7).
 9. Establish partnerships with universities for focused research (yr 1-7).
 10. Complete the remaining 60% of the easements and/or acquisition for the Sacramento River meander corridor identified under the SB 1086 Program (yr 1-7). Provide assurances for and participation by Sacramento River users and landowners that provides indemnification of affected parties against flooding impacts on neighboring landowners and impacts on water diverters.
 11. Acquire flood plain easements, consistent with ecosystem and flood control needs along the San Joaquin River in coordination with the Corps' Sacramento and San Joaquin River Basins Comprehensive Study (yr 4-7).
 12. Continue high priority actions that reduce direct mortality to fishes (yr 1-7):
 - Aggressively screen existing unscreened or poorly screened diversions in the Delta, on the Sacramento River, San Joaquin River, and tributary streams based on a systematic priority approach.
 - Remove select physical barriers to fish passage.
 13. Continue gravel management; e.g., isolate gravel pits on San Joaquin River tributaries and relocate gravel operations on Sacramento River tributaries (yr 1-7). Most gravel work would be implemented in subsequent stages with designs and plans for ecosystem reclamation of gravel mining sites.
 14. Begin implementing the CALFED comprehensive non-native (exotic) invasive species prevention, control, and eradication plan including the following (yr 1-7):
 - Implement invasive plant management program in Cache Creek.
 - Develop ballast water management program.
 - Develop early-response invasive organism control programs.
 - Evaluate CALFED implementation actions and how those actions may benefit non-native species to the detriment of native species or the Bay-Delta ecosystem.
 15. Provide incremental improvements in ecosystem values throughout the Bay-Delta system in addition to habitat corridors described above; e.g., pursue actions that are opportunity-based (willing sellers, funding, permitting, etc.), provide incremental improvements on private land through incentives, develop partnerships with farmers on "environmentally friendly" agricultural practices, etc. (yr 1-7).

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16. Incorporate ecosystem improvements with levee associated subsidence reversal plans (yr 1-7).
 17. Evaluate the feasibility of harvest management to protect weaker stocks (yr 1-7).
 18. Implement projects on selected streams to provide additional upstream fishery habitat by removing or modifying barriers, see also discussion of Fish Migration Barrier Removals in Section 2.7 - Storage (yr 1-7).
 19. Working with the CALFED agencies, assist in the preparation of detailed, ecosystem-based restoration and recovery plans for any priority species identified in the ERP Strategic Plan and the MSCS for which up-to-date plans are not available. Begin implementing appropriate additional restoration actions identified in these plans (yr 1-7).
 20. In coordination with South Delta Improvements (Conveyance), identify and advance specific regional ERP goals (yr 1-7).

Water Use Efficiency

The CALFED water use efficiency (WUE) element is designed to accelerate the implementation of cost-effective actions to conserve and recycle water throughout the State in order to increase water supplies available for beneficial uses. The major components of the program are: 1) support ongoing urban and agricultural sector processes for certifying and endorsing local agency implementation of cost-effective efficiency measures; 2) provide technical and planning assistance to local agencies and districts developing and implementing WUE measures; and 3) institute a competitive grant/loan incentive program to encourage WUE investments in the urban and agricultural sectors.

1. Expand Existing State and Federal Agricultural Water Conservation Programs to Support On Farm and District Efforts - Expand State and federal programs (Department of Water Resources [DWR], U. S. Bureau of Reclamation [USBR], U. S. Fish and Wildlife Service [USFWS], Department of Fish and Game [DFG], Department of Health Services [DHS], Natural Resources Conservation Service [NRCS], and SWRCB) to provide technical and planning assistance to local agencies and districts in support of local and regional conservation and recycling programs (yr 1-7).
2. Expand Existing State and Federal Conservation Programs to Support Urban Water Purveyor Efforts - Expand State and federal programs (DWR, USBR, USFWS, DFG, DHS, and SWRCB) to provide technical and planning assistance in support of conservation and recycling programs (yr 1-7).
3. Agricultural Water Management Council (AWMC) Evaluation of Agricultural Water Management Plans - Utilize the AB 3616 AWMC to evaluate and endorse plans to implement cost-effective water management practices by agricultural

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- districts. Identify and secure ongoing funding sources for AWMC and its members seeking to actively participate in the development, review, and implementation of these plans (yr 1-7).
4. Develop Urban Water Management Plan Certification Process - Select an agency to act as certifying entity, obtain legislative authority, carry out public process to prepare regulations, and implement program (yr 1-3).
 5. Implement Urban BMP Certification Process - Implement a process for certification of water suppliers' compliance with terms of the Urban MOU with respect to analysis and implementation of BMP's for urban water conservation. Provide funding support for the California Urban Water Conservation Council (CUWCC) to carry out this function (yr 1-7).
 6. Prepare a program implementation plan, including a proposed organizational structure consistent with the overall CALFED governance structure, for an competitive grant/loan incentive program for WUE (yr 1). This will include:
 - Incentives in the agricultural sector that will consider several factors, including: (i) potential for reducing irrecoverable water losses; (ii) potential for attaining environmental and/or water quality benefits from WUE measures which result in reduced diversions; (iii) regional variation in water management options and opportunities; (iv) availability and cost of alternative water supplies; and (v) whether the recipient area experiences recurrent water shortages due to regulatory or hydrological restrictions. Many of these factors are included in the Quantifiable Objectives for Agricultural Water Use Efficiency, and as such, the Quantifiable Objectives will be an important component of the agricultural incentive criteria.
 - Incentives in the urban sector will assist in identifying and implementing urban water conservation measures that are supplemental to BMP's in the Urban MOU process and are cost effective from a statewide perspective.
 - Incentives for water recycling in the urban and agricultural areas.
 - The plan will include annual reporting and evaluation mechanisms to gauge effectiveness of the program.
 7. Refuge Water Management - Finalize and implement the methodology for refuge water management which was described in the June 1998 "Interagency Coordinated Program for Wetland Water Use Plan, Central Valley, California" (yr 1-3).
 8. Research effort to establish appropriate reference conditions for evaluating program progress, and to identify improved methods for WUE (yr 1-7).
 9. Assess the Need for Additional Water Rights Protections - After consultation with CALFED agencies, the Legislature, and stakeholders, evaluate the need for additional state regulations or legislation providing protection for water rights

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- holders who have implemented WUE measures and subsequently transferred water to other beneficial uses (yr 1-4).
10. Water Measurement - Develop, after consultation with CALFED agencies, the Legislature, and stakeholders, state legislation that requires appropriate measurement of water use for all water users in California (yr 1-3).
 11. Create Public Advisory Committee - Within the context of the broader CALFED public involvement plans, create a public advisory committee to advise State and Federal agencies on structure and implementation of assistance programs, and to coordinate State, federal, regional and local efforts for maximum effectiveness of program expenditures (yr 1).

Water Transfer Framework

The water transfer framework is designed to facilitate, encourage, and streamline the water transfer process while protecting water rights and legal users of water and addressing and avoiding or mitigating third-party socioeconomic impacts and local groundwater or environmental impacts. This would occur through a proposed framework of actions, policies and processes. The first stage implements the recommended changes which will continue in subsequent stages.

1. Develop an Interactive Water Transfer Information Web-site - CALFED agencies will develop, implement, and maintain an interactive, publicly available web-site called On Tap (yr 1-7). This site will serve as an interim and long-term interface to stakeholders and the public with respect to CALFED water transfer actions including: 1) streamlining the approval process, 2) defining transferrable water, 3) providing public disclosure of proposed transfers, and 4) facilitating the sharing of water transfer related data, research, and assessment methodology. The web-site will initially be designed to include:
 - an on-line transfer application process that will provide proponents with information regarding who has approval authority (USBR, SWRCB, DWR), what must be provided to the responsible agency, and what criteria the agency will use during the review period;
 - a searchable database of all approved transfers (going back to the late 1980's and adding new transfers as they are approved); and
 - information regarding other CALFED Water Transfer Program actions.Initial aspects of this web-site will be publicly available in the first year after signing of the Programmatic ROD.

Improve Information Sharing:

2. Establish the California Water Transfers Information Clearinghouse to operate and maintain the On Tap web site, collect and disseminate data and information relating to water transfers and potential transfer impacts, and perform research using historic data to understand water transfer impacts (yr 1-7).
3. Coordinate with CALFED agencies to require water transfer applicants to provide additional impact assessment information as allowed under existing law (yr 1-4).
4. CALFED agencies will identify, arrange, fund, and carry out a specific number of targeted water transfers for in-stream environmental purposes as part of the ERP, with a goal of using these transfers to evaluate the effectiveness of and make any necessary improvements to California Water Code Section 1707 procedures and tracking protocols (yr 1-3).
5. As part of the WMS, a groundwater assistance program (discussed more explicitly under Storage tools) will be established to fund studies to gather groundwater data and to enable local entities to develop and implement local groundwater management/monitoring programs (yr 1-2).

Lower Transaction Costs Through Permit Streamlining:

6. Development by CALFED agencies of a streamlined water transfer approval process including "pre-certification" of certain classes of transfers and expedited environmental review procedures (yr 1-6).
7. CALFED agencies work with stakeholder representatives to clarify and define what water is deemed transferrable under what conditions (yr 1-3).
8. CALFED agencies continue to work with stakeholder representatives to resolve conflicts over carriage water criteria (yr 1-3).
9. Establish a refill criteria policy for reservoir storage based water transfers (yr 1).

Increase the Availability of Existing Facilities for Water Transfers:

10. Begin forecast and disclosure process of potential conveyance capacity in existing export facilities (DWR and USBR). This would be an on-going activity, occurring in conjunction with hydrologic forecasts (yr 1-7).
11. CALFED agencies will work with stakeholders to develop an agreed upon set of criteria and procedures governing the determination of transport system availability and costs, including the procedures to determine the fair reimbursement to the water conveyance facility operator (yr 1-3).

Watershed Program

The Watershed Program will promote collaboration and integration among existing and future local watershed programs and provide technical assistance and funding for watershed activities that support the goals and objectives of the CALFED Bay-Delta Program. The actions during Stage 1 are a mix of watershed coordination, restoration, maintenance, and conservation activities, as well as demonstration projects designed to illustrate the benefits of watershed management to the Bay-Delta system while also benefitting existing watershed resources.

1. Fund and implement community based watershed restoration, maintenance, conservation, and monitoring activities that support the goals and objectives of the CALFED Program (yr 1-7).
2. Assist local watershed groups and government agencies to address common issues, including roles and responsibilities, funding support, technical assistance, information exchange, and to ensure effective communication and implementation among government agencies and stakeholder groups (yr 1-7).
3. Implement a funding process and provide watershed stewardship funds to build the capacity of community based programs to carry out comprehensive long-term watershed management (yr 1-7).
4. Improve the use and usefulness of existing or future watershed information management functions to provide data and other information to people involved in watershed management (yr 3-7).
5. Ensure the completion of project level environmental documentation and permitting; assist with documentation and permitting processes as appropriate (yr 1-7).
6. Evaluate the benefits (including economics) that accrue from watershed plans and projects designed to achieve CALFED goals and objectives (yr 3-7).
7. Establish, fund, and maintain watershed restoration and maintenance assistance to aid local watershed groups and private landowners in project concept, design, and implementation (yr 1-7).
8. Collaborate with other CALFED and non-CALFED programs on watershed related activities (yr 1-7).
9. Provide appropriate information and assistance to stakeholders and the Legislature to develop a state-wide umbrella watershed management act (yr 1).

Storage

Groundwater and surface water storage can be used to improve water supply reliability, provide water for the environment at times when it is needed most, provide flows timed to maintain water quality, and protect levees through coordinated operations with existing flood control reservoirs.

New groundwater and surface storage will be developed as appropriate to meet CALFED program goals as part of a comprehensive WMS that includes aggressive implementation of water conservation, recycling, an improved water transfers market, and habitat restoration. Decision to construct groundwater or surface storage will be predicated on maintaining balanced implementation of all Program elements and compliance with all environmental review and permitting requirements.

During Stage 1, CALFED intends to take the necessary steps to pursue expansion of two existing reservoirs and construction of a new off-stream reservoir, with a total capacity of 950 thousand-acre-feet (TAF) and a major expansion of groundwater storage for an additional 500 TAF to 1 million-acre-feet (MAF). In addition, CALFED will study two potential reservoir locations through partnerships with local agencies. These projects are described in the Phase II Report. CALFED will continue to evaluate these surface and groundwater storage opportunities, initiate permitting, NEPA and CEQA documentation, and construction - if all conditions are satisfied. These efforts will be coordinated under CALFED's Integrated Storage Investigation (ISI).

In addition, CALFED will continue work to refine and periodically update the WMS. ISI studies will evaluate the utility of specific storage projects in providing water quality, water supply reliability, and ecosystem benefits. This information, together with information gained from implementation of other CALFED Program elements and updated information on California's changing water management needs, will be considered in an Evaluation Framework. This Framework will include: 1) a comprehensive hierarchy of objectives for the CALFED Program; 2) well-defined measures of performance associated with the achievement of objectives; and 3) provide a basis for comparison of alternative long-term water management strategies. The Evaluation Framework will provide a structure for periodically updating the WMS and determining appropriate levels of the future investment in various water management tools.

Groundwater Banking and Conjunctive Use - *Develop locally managed and controlled groundwater and conjunctive use projects with a total of 500 TAF to 1 MAF of additional storage. This effort includes developing cooperative partnerships with local agencies and landowners in both the north-of-Delta and south-of-Delta areas, and includes construction of several south-of-Delta projects. Additional south-of-Delta and north-of-Delta projects, if feasible, could be constructed in later stages.*

1. Finalize agreements with new local project proponents for joint planning and development (yr 1).
2. Begin feasibility studies (yr 1).
3. Report on the performance of feasibility studies, implementable projects, and potential benefits and beneficiaries (yr 3).
4. Implement early stages of the most promising projects (yr 1-5).
5. Aggressively pursue implementation of additional project (yr 1-7).

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6. Support legislation that supports groundwater management by local agencies at the sub-basin level.

Surface Storage - *CALFED agencies identified a list of twelve potential surface storage projects that are in varying stages of the environmental review or feasibility process. Actions taken in Stage 1 will focus on completing the necessary studies to implement or proceed with five surface storage projects:*

1. In-Delta storage project (approximately 250 TAF) - An in-Delta storage facility can provide both fishery benefits and enhances water project flexibility. CALFED will explore the lease or purchase of the Delta Wetlands project. CALFED also will initiate a new project, in the event that Delta Wetlands proves cost prohibitive or infeasible (Planning: yr 1-2, Construction: yr 3-7).
2. Expand CVP storage in Shasta Lake by approximately 300 TAF - Such an expansion will increase the pool of cold water available to maintain lower Sacramento River temperatures needed by certain fish and provide other water management benefits (Planning: yr 1-4, Construction yr 6-7).
3. Expand Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative - As part of a Bay Area initiative, an expanded Los Vaqueros Reservoir would provide water quality and water supply reliability benefits to Bay Area users. As an existing reservoir operated by the Contra Costa Water District (CCWD), the Los Vaqueros Reservoir is subject to a number of mandates and agreements, CALFED intends to work with CCWD and interested stakeholders to assure that previous commitments, including local voter approval required for expansion, are respected (Planning: yr 1-5, Construction yr 6-7).
4. Sites Reservoir - Construction of Sites Reservoir, with a project capacity of up to 1.9 MAF, could enhance water management flexibility in the Sacramento Valley. By reducing water diversion on the Sacramento River during critical fish migration periods, this project can greatly increase reliability of supplies for a significant portion of the Sacramento Valley. It can also provide storage and operational benefits for other CALFED programs including Delta water quality and the EWA. CALFED will join local partners to evaluate this project in Stage 1 (yr 1-5). Extensive technical work, significant environmental review, and development of cost-sharing agreements must be completed before a decision to implement this project as part of the CALFED Program can be made.
5. Additional storage in the upper San Joaquin River watershed - Additional storage capacity of between 250-700 TAF would be designed to contribute to restoration of and improved water quality for the San Joaquin River and facilitate conjunctive water management and water exchanges that improve the quality of water deliveries to urban communities. Additional storage could come from

enlargement of Millerton Lake at Friant Dam or a functionally equivalent storage program in the region. CALFED will join local partners to evaluate this project in Stage 1 (yr 1-6). Extensive technical work, significant environmental review, and development of cost-sharing agreements must be completed before a decision to implement this project as part of the CALFED Program can be made.

Power Facilities Reoperation Evaluation - *There is the potential to reoperate some hydroelectric facilities to produce water supply or ecosystem benefits. The following actions will be taken in the context of the ISI.*

1. Identify beneficiaries and negotiate cost sharing agreements (yr 1-7).
2. Work with CALFED agencies, the Public Utilities Commission, the SWRCB, the Federal Energy Regulatory Commission, and interested stakeholders to identify reoperation opportunities (yr 1-2)
3. Develop environmental documentation (yr 3-5).
4. Perform feasibility studies and economic analyses (yr 3-5).
5. Obtain permits, negotiate operating agreements, and seek site specific authorization as required (may require design of facilities modifications to accommodate new operational priorities) (yr 5-7).
6. Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Fish Migration Barrier Removal Evaluations - *As part of the ERP some obstructions to fish passage such as small dams are being considered for modification or removal in order to restore anadromous fish access to critical spawning habitat. The following actions will be taken in the context of the ISI:*

1. Work with CALFED agencies, the SWRCB, local water agencies, and interested stakeholders to identify opportunities for modification or removal of obstructions such as small dams (yr 1-2).
2. Develop environmental documentation (yr 3-5).
3. Perform feasibility studies and economic analyses (yr 3-5).
4. Obtain permits, negotiate agreements, and seek site specific authorization as required (may require design of facilities modifications or removal actions) (yr 5-7).
5. Identify beneficiaries and negotiate cost sharing agreements (yr 5-7).
6. Begin construction (if needed) and begin new operations if conditions and linkages are satisfied (yr 6-7).

Conveyance

CALFED's basic strategy is to develop a through-Delta conveyance alternative based on existing Delta configuration with some modifications. Some construction of improvements in the south and north Delta should occur within the first stage to improve conditions for ecosystem and water management reliability. Part of the first stage consists of site-specific environmental review and permitting. This will allow conveyance projects to be ready for construction in later stages should the projects be necessary to meet Program objectives.

South Delta Improvements - *South Delta Improvements consist of methods to control flow, stage and circulation, improve fish passage, fish screen and salvage facilities, and potentially provide SWP/CVP interties upstream and downstream of the export pumps. South Delta conveyance improvements included in Stage 1 would function with the basic through-Delta conveyance strategy or potential modifications. The conveyance improvement actions listed below would be implemented concurrently with other South Delta Improvements, Stage 1 actions, and components of the other CALFED Program elements.*

1. Construct and evaluate a 500 cubic feet per second (cfs) test facility at the Tracy Pumping Plant to develop best available technology for fish screening and salvage for the intakes to the SWP and CVP export facilities (yr 1-7).
2. Construct a new screened intake for Clifton Court Forebay for the full export capacity of the SWP (yr 1-7+).
3. Implement Joint Point of Diversion for the SWP and CVP (yr 1-7).
4. Evaluate and decide on whether to retain a separate CVP intake facility or to consolidate with the SWP facility. Also evaluate and potentially implement an intertie between the project canals downstream of the export pumps (yr 1-7).
5. Increase SWP pumping by 500 cfs from July through September (yr 1-4).
6. Facilitate SWP export flexibility up to 8,500 cfs with appropriate constraints (yr 1-3).
7. Obtain permits to use full SWP capacity of 10,300 cfs for operational flexibility, consistent with all applicable operational constraints, for water supply and environmental benefits (yr 1-7+).
8. Dredge and install operable barriers to ensure water of adequate quantity and quality is available for diversion to beneficial uses within the south Delta (yr 1-7). For the purposes of the project level environmental analysis for the South Delta Improvements, various operable barrier configuration alternatives or their functional equivalents will be evaluated including the installation of a permanent fish migration barrier at the Head of Old River and construction of three permanent flow control structures at Old River at Tracy, Middle River upstream of Victoria Canal, and Grant Line Canal. The Grant Line Canal would be constructed and operated in accordance with conditions and directions

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- specified by USFWS, National Marine Fisheries Service (NMFS), and DFG. All temporary barriers installations will be phased out as soon as feasible.
9. Form a Barrier Operations Coordination Team, consisting of USFWS, NMFS, DFG, DWR, USBR, and stakeholder representatives to operate the barriers (yr 1-7).
 10. Monitor barrier effects on fish, stages, circulation, and water quality (yr 1-7).
 11. Dredging of selected channel segments to limit scour velocities and for water supply availability, navigation, and flood control (yr 3-7).

North Delta Improvements - *Provide a coordinated regional solution to ecosystem, watershed, water quality, water supply reliability, and flood control concerns in the North Delta Region. North Delta improvements consist of methods to address flood control, water quality, fisheries, and water supply reliability concerns. Actions include modification of the Delta Cross Channel operational criteria, channel dredging and/or setback levees in the Mokelumne River, and creation of additional flood plain, wildlife, and fisheries habitat. A screened diversion on the Sacramento River will be evaluated and may be implemented if necessary.*

1. Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns (yr 1-4).
2. Simultaneously evaluate a screened through-Delta facility with a diversion capacity of up to 4,000 cfs on the Sacramento River. This evaluation would consider the effectiveness of water quality measures and how to operate the Delta Cross Channel in conjunction with this new diversion structure to improve drinking water quality, while maintaining fish recovery (yr 1-4).
3. Complete environmental review of recommended Delta Cross Channel operational procedures and the screened diversion evaluations. If the environmental review demonstrates that this diversion facility is needed to improve water quality in the Delta and at the export facilities, and can be constructed and operated without adverse effects to anadromous and estuarine fish, construction will begin late in Stage 1. This diversion would likely include a fish screen, pumps, and a channel between the Sacramento and Mokelumne Rivers. The historic emphasis has been on a screened diversion at Hood on the Sacramento River. This and other potential sites will be considered as part of this evaluation (yr 4-7).
4. Evaluate opportunities to resolve local flood concerns and create tidal wetlands and riparian habitats by constructing new setback levees, improving existing levees, and dredging channels in the north Delta, especially the channels of the lower Mokelumne River system. Any proposed channel modification would be consistent with CALFED's current direction on Delta conveyance. This evaluation would carefully coordinate ecosystem restoration, regional flood control, levee system integrity, and conveyance issues and concerns to ensure that a balanced solution to all concerns would be proposed (yr 1-7).

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5. Facilitate region-wide coordination of all CALFED related projects in the north Delta region (yr 1-7).

Additional Conveyance Actions - *A process for determining the conditions under which any additional conveyance facilities and/or other water management actions would be taken in the future would include:*

1. An evaluation of how water suppliers can best provide a level of public health protection equivalent to Delta source water quality of 50 parts per billion (ppb) bromide and 3 parts per million (ppm) TOC (yr 1-7). This will include an equivalent level of investigation and studies on all of the actions which could be used to achieve CALFED's targets.
2. An evaluation based on two independent expert panels' reports: one on CALFED's progress toward these measurable water quality goals and the second on CALFED's progress toward ecosystem restoration objectives, with particular emphasis on fisheries recovery (yr 6-7).
3. Additional environmental review. Construction of an isolated facility component of a dual Delta conveyance is not an element of the CALFED Preferred Program Alternative. A decision to construct such a facility would require separate environmental review and alternatives analysis that has not been done as part of the CALFED programmatic analysis.

Governance Arrangements

After the ROD, CALFED will begin the implementation phase of the Program. The CALFED agencies are proposing the creation of a joint state and federal commission to oversee and direct the CALFED Program in the long-term. A new commission will require State and federal legislation. In the interim, until a new commission is established, the CALFED agencies will use the Policy Group governance structure. A new Interim Governance Agreement will be developed and executed, which describes the interim governance structure and decision-making process.

1. Implement the interim governance structure and decision-making process at the time of the ROD. The interim structure and functions will continue until the long-term structure is in place.
2. Establish CALFED Independent Science Board, establish EWA independent science panel, establish other independent science panels as needed.
3. Form public advisory council to advise the new commission or Policy Group.
4. Initiate actions to implement the long-term governance structure for CALFED. New federal and state legislation will be needed to clarify/modify existing agency

authorities and to establish a new joint federal-state commission for program oversight and implementation.

5. Establish the new commission: implement administrative, fiscal, personnel changes to form the commission.

Finance

The Financing Plan contains the initial framework for developing a strategy for funding the Preferred Program Alternative (including total costs for implementation/improvements, mitigation, and ongoing annual operating and maintenance costs). Proposed funding sources would include a combination of federal, state, private, and user funds. Financing will be needed over several decades as the various parts of the Preferred Program Alternative are selected, implemented, operated, and maintained. The Financing Plan includes financial principles incorporating a benefits-based approach, a discussion of historical cost-sharing, cost-allocation procedures, proposed cost-sharing scenarios, cost estimates for Stage 1 of Program Implementation, and a preliminary identification of classes of beneficiaries for each of the Program elements. The Plan recognizes the public and user benefits derived from water quality, environmental protection, flood control, recreation, and a reliable water supply.

1. Establish reliable short-term and long-term funding for each program element and for each package of Stage 1 actions (1-7):
 - Finalize cost-share agreements (yr 1-2).
 - Finalize details surrounding repayment or crediting (yr 1-2).
 - Seek legislation and budget authority for financing, including federal and state appropriations, new authority for state bonds, private financing, and new user fees (yr 1-7).
 - Work with local interests to develop state legislation to create a user fee that will generate reliable funding for program elements with broad public benefits, such as the Ecosystem Restoration Program (yr 1-2).
 - Develop and refine cost estimates as program actions are identified (yr 1-7).
 - Prepare a cross-cut budget on an annual basis showing the funding of related state and federal programs and incorporate into finance strategies and funding requests (yr 1-7).

Science Program

As part of the Science Program, establish monitoring, data assessment, and research activities for all program elements which provide information for evaluating the effectiveness of the

program actions in reaching the program objectives. All the monitoring, data assessment, and research activities will be done within an adaptive management framework. Consequently, most of the activities will be undergoing continual refinement through the duration of the program. The program will be designed to examine 30 year trends within which, components will be tailored to examine the short term time step of the 1-7 year Phase III, Stage 1 Program.

1. Periodic review and refinement of the monitoring, data assessment, and research plan from a long term perspective (yr 1-7+).
2. Periodic review and refinement of the monitoring, data assessment, and research plan from a short-term perspective which would include all elements of the Phase III, Stage 1 Program (yr 1-7+).
3. Help management define triggers and time periods which determine the need for a change in program direction (yr 1-7+).
4. Continue to develop and refine conceptual models to be used in evaluating actions undertaken by the programs. In keeping with the adaptive management format, the models will be continually updated (yr 1-7+).
5. Through a peer review process, evaluate the validity of the data evaluation and the application of the evaluation by the program decision making process (yr 1-7+).
6. Review the progress towards achieving overall CALFED program goals and objectives (yr 1-7+).
7. Complete monitoring identified by diversion-effects-on-fisheries team to provide feedback on actual diversion effects of south Delta pumps (yr 2-7).
8. Design long-term, system wide, baseline monitoring with focused research to increase understanding of ecological processes and ways to reduce uncertainty; definition of needed studies is currently under development, the following are examples:
 - Conduct focused research on Delta hydrodynamics and linkage to food web including relation to location of diversion point.
 - Study population trends of fish using the Delta, including fish salvage at south Delta export facilities, with emphasis on San Joaquin River fall run chinook salmon, delta smelt, and Mokelumne River fall run chinook salmon and steelhead trout.
 - Expand real-time monitoring for enhanced fish protections and flexible operations for water suppliers.
9. Provide available data on need to reduce bromides, total dissolved solids, TOC, pesticides, and trace metals (yr 5).
10. Provide available data on water quality in south Delta and lower San Joaquin River (yr 1-7).
11. Monitor and assess the impacts of WUE measures on water demands and available supplies, and develop better information for water balances in the Bay-Delta system (yr 1-7).

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12. Prepare annual reports on status and progress, including such information as: performance of habitat restoration actions compared to expected results, summaries of any new information on the relative importance of various stressors, and any need for adjustments in actions or conceptual models (yr 1-7).
 13. Analyze status and need for adjustments of actions for later stages (yr 5-7).
 14. Monitor and report land use changes, such as agricultural land conversion, resulting from CALFED actions (yr 2-7).
 15. Hire an interim science leader and subsequently hire a chief scientist (yr 1-2).
 16. Appoint an Independent Science Board and an independent science panel for the EWA (yr 1-2).
 17. Coordinate existing monitoring and scientific research programs (yr 1-7).
 18. Refine the set of ecological, operational, and other predictive models which will be used in the evaluative process (yr 1-2).
 19. Establish and refine performance measures and indicators for each of the program areas (yr 1-7).

Regulatory Compliance

1. For each action in the program, ensure that the appropriate environmental documents are prepared, tiering off the Programmatic EIS/EIR, and that all necessary permits are obtained (yr 1-7).
2. For each action in the program, ensure compliance with applicable or relevant and appropriate requirements (yr 1-7).
3. Tiering from the MSCS, begin to develop the project specific restoration, avoidance, minimization, and compensation measures necessary to recover MSCS covered species and to prevent additional listings in the Delta (yr 1-7).
4. Implement a CALFED environmental documentation, mitigation, and permit coordination process (yr 1-7).

4.2 Governance Plan

The governance and decision-making structure for implementation of the CALFED Preferred Alternative is a key feature in assuring successful program implementation. The CALFED agencies have developed a proposal for long-term governance of the CALFED Program. The State and Federal administrations strongly believe that a new a joint Federal-State commission must be created through State and Federal legislation to oversee long-term implementation. This approach will require resolution of Federal Constitutional concerns. In the near-term the CALFED agencies will rely on an interim governance structure similar to the current voluntary

structure to bridge the gap before appropriate legislation can be completed establishing a permanent structure.

Schedule for Governance Decisions and Implementation

- Interim Governance
 - New Implementation MOU adopted by the time of the ROD.
 - Operates until a long-term governance structure adopted
- Long-Term Governance
 - Proposal in Final EIS/EIR
 - Legislation needed to finalize
 - Expect long term governance in place in 2-3 years (2002- 2003)

The *Implementation Plan* volume of the *Final Programmatic EIS/EIR* contains the Governance Plan. The Governance Plan includes a description of the governance functions necessary for implementation, a proposal for long-term governance, and an interim governance structure until the permanent structure is in place. A summary of the Governance Plan is provided below.

Program Functions for Implementation Phase

As CALFED moves into program implementation (Phase III) from the planning phase, new responsibilities and functions will be required. Before proposing a governance structure suitable for program implementation, CALFED first identified the basic functions that will need to be performed in Phase III. CALFED has organized functions for implementation of the program into three categories to accommodate the complexity of the program; program direction, program management, and direct implementation.

5. Program Direction and Oversight Functions.

- Oversight of CALFED Program Implementation. Develop policies and make decisions in order to achieve program goals and objectives, make decisions at program milestones (staged decision-making), and provide direction to ensure balanced implementation, integration, and continuous improvement in all program areas.

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- Program Assessment and Modification. Assess overall achievement of program goals and objectives, and modification, as needed, of program goals and objectives. Modification would be done in coordination with the appropriate agencies and with public input.
 - Review and Approve Priorities and Budgets. Review and approval of program priorities and budgets in all program areas.
 - Coordination and Integration of Related Programs. Coordinate, and if appropriate integrate, CALFED Program with other related programs to maximize available resources and reduce conflicts and inconsistencies with other programs. Programs would need to be identified within the State and Federal agencies that are most related to CALFED objectives to determine what level of coordination and integration those programs should have with CALFED.
 - Conflict/Dispute Resolution. Facilitate resolution of conflicts/disputes between CALFED agencies.
 - Public Outreach and Communication. Provide for public input and communication for the CALFED Program as a whole.
 - Legislative Communication. Communicate with Congress and the California Legislature; report on program progress; answer legislative inquiries; review and respond to legislative proposals; and to review and submit legislative proposals.

2. Program Management Functions.

- Manage program implementation
- Identify priorities, propose actions, develop budgets
- Assess and report on program area performance
- Coordinate with implementing agencies and stakeholders, and between program areas

3. Direct Implementation Functions. These functions have been identified separately because some agencies which may be involved in CALFED program implementation may not have program management responsibility. For example, one entity will be responsible for program management of the ERP (Bay-Delta Program in the interim), but there will be many agencies and organizations responsible for direct implementation of ERP actions. Direct implementation functions include:

- Responsibility for direct implementation of individual actions.

- Report on assessment and monitoring of individual actions
- Prepare environmental documentation and obtain permits
- Stakeholder and local coordination for individual actions

Interim CALFED Governance

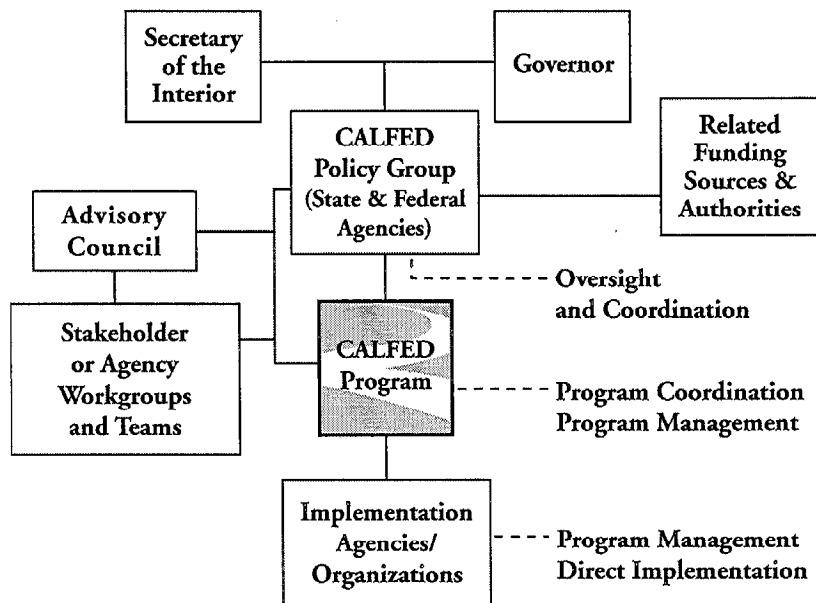
The interim structure will be in place from the time of the ROD until a long-term permanent structure is adopted through State and Federal legislation. For interim governance, CALFED proposes adoption of the current CALFED structure being used during the planning stage, but adapted for implementation. The interim governance structure, including identification of how decisions will be made, will be set forth in a new Implementation MOU which the agencies will develop and execute by the time of the ROD. The current structure is made up of the Policy Group reporting to the Governor and Secretary of the Interior, public advisory groups, the Bay-Delta Program Executive Director and staff, and State and Federal agencies and teams. This structure, with additions and modifications, will serve to bridge the gap until a permanent commission is established.

Interim Implementation Functions and

Responsibilities. Described below is a general description of responsibilities and functions for interim implementation of the Preferred Alternative.

Policy Group and CALFED Bay-Delta Program. In the interim, the program direction functions will continue to be performed by the CALFED Policy Group with support by the CALFED Bay-Delta Program staff. Bay-Delta Program staff will provide program direction and coordination for priorities, workplans, and budgets developed by State and Federal agencies participating in CALFED implementation.

CALFED Interim Governance Structure and Functions



Program priorities, workplans and budget requests for “Primary” CALFED Programs (those programs targeted at CALFED objectives) should be reviewed by the CALFED Policy Group. While final approvals will continue to rest with the agencies with program and funding authority, Policy Group will provide recommended approvals to the funding agency. This review and coordination is critical in the interim to ensure programs and funding are meeting CALFED objectives.

Public Involvement. In the interim, public involvement in the implementation of the Program will be through public advisory groups and through public Policy Group meetings. A broad public advisory group will be formed to meet jointly with Policy Group and separately as needed. Public involvement will continue to be provided through groups focused on individual program areas, such as the Drinking Water Council, the Ecosystem Roundtable, and other workgroups. In addition, regional advisory groups may be established. Other options for structuring public involvement in the interim are being evaluated.

Funding. As CALFED implementation begins, it is critical that the program demonstrates progress in meeting its objectives and demonstrates an integrated program. Although State and Federal agencies that are members of the CALFED Policy Group are in strong support of a coordinated program, it will be a challenge to oversee and coordinate a fragmented program in which all funding and program authority rests in numerous agencies. In the interim, CALFED Policy Group and Bay-Delta Program staff will provide funding coordination and integration among the many agencies. This will be especially necessary with regard to “Primary” CALFED Programs--those programs and funding targeted at CALFED objectives. Program priorities, workplans, and budget requests for primary CALFED programs should be coordinated with the Bay-Delta Program staff and reviewed by the CALFED Policy Group. While final approvals will continue to rest with the agencies with program and funding authority, Policy Group will provide recommended approvals to the funding agency. CALFED agencies will define the primary CALFED programs and funding in the Implementation MOU by the time of the ROD. Specifically, Bay-Delta Program staff will coordinate with State and Federal agencies on budget requests, workplans, and priorities.

Interim Program Management. Program management functions for each program area will in most cases be performed by State and Federal agencies which currently have program and funding authorities. With program management responsibilities distributed among many agencies, it is important that agencies closely coordinate to achieve the CALFED objectives. For several programs such as the ecosystem restoration, watershed, and drinking water quality programs, the Bay-Delta Program will be assigned the program management responsibilities in order to reduce fragmentation among existing agencies. In all cases, however, CALFED agencies will retain and exercise their statutory authorities. The term “program management” does not suggest any delegation of an agency’s authority to the Bay-Delta Program.

Long-term Governance Proposal

CALFED strongly believes that a new public agency needs to be created to oversee the long-term implementation of the CALFED Preferred Alternative. The CALFED agencies support legislation to create a joint Federal-State commission. This approach will require resolution of Federal Constitutional concerns. The legislative charge to the new Commission should be to provide program direction and oversight of the program. The commission would be assisted by an advisory committee whose members would include qualified representatives from Indian tribes and stakeholder groups. A joint commission made-up of high-level appointees would maintain visibility inside and outside the government, assure agency coordination, help secure funding, and provide policy leadership. The CALFED agencies propose a 12 member commission made up of equal numbers of high level officials of the Federal and State agencies responsible for implementing CALFED programs and a similar number of high level stakeholder and tribal representatives.

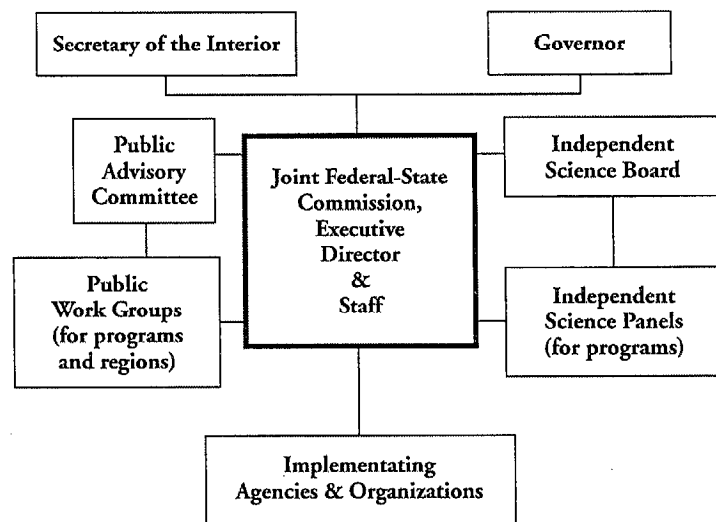
This proposal for a new commission embodies an integrated approach to water and environmental management in the Bay-Delta system that requires a shift in authorities and management of these critical resources. CALFED has adopted the following principles that summarize the essential elements of the governance proposal.

Principle 1: Federal/State Partnership. *The CALFED Program, as defined in the final PEIS/R and accompanying documents, should be carried out through a State and Federal government partnership.*

Principle 2: Accountability. *There should be a clear point of, and process of accountability of the Program to the Legislature, the Congress, and the public.*

Principle 3: Commission. *A new commission should be created to provide direction and oversight of the Program to achieve CALFED Bay-Delta Program goals and objectives.*

CALFED Long-Term Governance Structure



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- Principle 4:** Membership. The membership of the commission should be made up of State, Federal, tribal and public members. Public members should represent a broad array of interested constituencies. State and Federal members should be representatives at the highest level of the agency organization.
- Principle 5:** Leadership. The governing structure and authorities of the commission should be designed to attract effective leadership.
- Principle 6:** Changes in Authorities. The commission will not exercise or supplant any regulatory authorities. However, changes in specified program and funding authorities should be made in legislation to consolidate or coordinate management of each program area.
- Principle 7:** Agency/Tribal Participation. The commission should establish a process to support participation and coordination with agencies (Federal, State, and local) and tribes involved in and affected by the CALFED Program who are not members of the commission. The commission should facilitate government -to-government consultation with the tribes.
- Principle 8:** Public Involvement. The commission's meetings should be open and public, and the commission should seek ways to maximize public knowledge of, and involvement in, its work. The commission should support involvement in the Program at a community-based level.
- Principle 9:** Program Management. Program management for each of the program areas should be specified in legislation establishing the commission. Each program area should be evaluated to determine the appropriate entity for assuming program management functions. Responsibility for program management will vary between program areas depending on the nature of the program and actions, the expertise of agencies, and the ability of the agency to manage the programs without significant conflicting mandates.
- Principle 10:** Comparable Authority over Program areas. Each of the program areas should have the same degree of autonomy from, as well as the same degree of accountability to, the commission. For each program area, the commission should exercise a comparable degree of authority over specified funding and programs.
- Principle 11:** Funding. Funding for implementation of the CALFED Program should be appropriated directly to the commission for those activities assigned to the

commission. For CALFED programs managed by another State or Federal agency, funding for the program should be appropriated directly to that agency, with control language requiring commission review, coordination, and approval of program plans, priorities and implementation.

Principle 12: *Crosscut Budget. For those funds and programs not under Commission approval but which are related to CALFED (to be specified in an interagency MOU), the appropriate agencies should participate in preparing an annual Crosscut Budget to ensure coordination with the CALFED Program.*

Principle 13: *Legislative Reporting. The commission should serve as the focal point for contact on the CALFED Program with Congress and the California Legislature, and should provide annual status reports on the Program.*

4.3 Financing Plan

With the signing of the Record of Decision, CALFED will need to have a financing plan in place to begin implementation. To be prepared for program implementation, a finance plan is needed to guide State and Federal administration and legislative discussions regarding new bonds, new fees, and proposed budget appropriations.

The Financing Plan contained in the *Implementation Plan* volume of the *Final Programmatic EIS/EIR* lays the initial framework for developing a CALFED Finance Plan. The Plan provides background, definitions, description of program benefits, description of possible funding sources, financing options, and issues to resolve to finalize a Finance Plan.

The Financing Plan for implementing the CALFED Bay Delta Program is a critical component of the program because of the assurance needed by CALFED agencies and stakeholders that a serious and concerted effort will be made to secure funding for all components over the life of the program. In developing financial strategies and cost sharing for the many aspects of the CALFED program, CALFED is following several basic steps:

- Identifying the priority actions for implementation
- Developing cost estimates for priority actions
- Identifying the funding and cost sharing formulas in existing laws and agreements

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- Identifying program/project benefits and beneficiaries
 - Identifying finance and cost allocation issues that affect the successful implementation of the program (promoting new technologies, changing attitudes/behaviors, ability to pay problems, characteristics of funding sources limiting program implementation)
 - Lastly, recommending the cost allocation and cost-sharing procedures and strategies for each program element and in some cases for individual projects. These recommendations will likely come during implementation.

Beneficiaries Pay. A fundamental philosophy of the CALFED program is that costs should, to the extent possible, be paid by the beneficiaries of the program actions. The CALFED agencies consider this policy to be equitable, and there are reasons, other than equity and fairness, that the beneficiaries-pay principle be applied to CALFED and other water resources programs. Having beneficiaries pay for public programs encourages them to more carefully review their water and power needs and the costs of proposed programs (including mitigation costs) in relation to the benefits they receive. Such a policy also encourages examination of a fuller range of alternatives, including locally funded measures, in order to assure that public funds are spent in the most cost-effective way to meet program goals.

In the first few years of Implementation, large shares of public funding will be needed to move the Program forward. State and Federal funds may be used not only for program elements with mostly public benefits, but may also be used for program elements that will likely have multiple benefits, including substantial non-public benefits. However, it is expected that beneficiaries will reimburse the public and pay for larger shares of the costs in the latter years of Stage 1. For example, public funds may be used for the planning and evaluation of storage projects to ensure a comprehensive and fair comparison of storage options. However, should a storage project proceed to construction, then the public funds used for planning and evaluation will be reimbursed by the project beneficiaries.

Historical Financing. CALFED's finance strategy must be considered within the current and historical context of State and Federal water resources financing. Historically, Federal water projects have been financed with appropriations and, in some cases, repayment was provided by beneficiaries at below market rates of interest (or no interest). This resulted in historically low levels of effective cost-sharing. Since the 1980's, Federal water resources agencies have been requiring higher levels of non-Federal cost-sharing, through higher levels of up-front cost sharing and other means. The Central Valley Project Improvement Act of 1992 enacted tiered water rates, Mitigation and Restoration payments, and other fees to be deposited into a Restoration Fund to be used for environmental purposes. Financing for the State Water Project relies principally on general obligation bonds and revenue bonds, with revenue bonds being backed by payments from water and power users which provides large repayment levels.

Program Benefits/Beneficiaries. At this time, because many of the actions have not yet been specified, (e.g. water use efficiency actions, storage sites), the specific benefits cannot be identified or measured, and program costs cannot be allocated to those benefits. In other cases, such as ecosystem restoration, benefits can be identified but not easily measured or assigned to specific beneficiaries. However, to initiate the finance discussions, and lay the framework for a CALFED finance strategy, the Financing Plan identifies expected benefits and beneficiaries at the program level. For actions where benefits can be measured, the program or project costs will be allocated among the measured benefits. For those programs where benefits cannot be reasonably measured (ecosystem, water quality, watershed programs), CALFED will need to identify a procedure or strategy for estimating and allocating costs. After the benefits analysis and cost allocation, CALFED may propose cost shares among beneficiaries that differ from existing State and Federal cost-sharing formulas or may use the cost-sharing formulas in existing programs.

The benefits from each program area (both near-term and expected future benefits), are described in the Financing Plan. In addition, the Financing Plan identifies cost allocation and cost-sharing issues, and potential cost-sharing options. In general, the options differ financially (the extent to which they require higher levels of repayment from beneficiaries), or institutionally (in terms of what mechanism they rely on to secure repayment, ranging from existing programs, up-front cost-sharing, recovery through water rates, or recovery through other user charges). Some of these options address user fees targeted at the beneficiaries of a particular program.

Financing Mechanisms. The Financing Plan compares several different financing mechanisms, all of which have been used to date and are expected to be used in the future, including State and Federal appropriations, State general obligation bonds, State water and power revenue bonds (tied to SWP water and power rates), private financing, user fees and a broad-based Bay-Delta system diversion fee. The advantages and disadvantages of these various funding sources and financing mechanisms are also described in the table below.

CALFED and CALFED stakeholders have discussed the use of a broad-based Bay-Delta system user, particularly to finance some of the programs or actions with public benefits, such as the Ecosystem Restoration Program (such a fee is discussed, for example, in the 1996 report on *Financing Options* produced by the California Business Roundtable, the California Chamber of Commerce, the California Farm Bureau Federation, and the California Manufacturers Association). This user fee would most likely apply to all major diverters of water from tributaries that flow into the Delta, as well as exporters of Delta water. The Financing Plan explores how such a broad-based user fee could be structured and what revenues could be expected for fees similar to those established in the CVPIA. The crediting of CVPIA revenues and other contributions to date would be an integral part of implementing any broad-based user fee.

Potential Funding Sources -- Advantages and Disadvantages		
Option	Advantages	Disadvantages
General obligation bonds	--Can achieve substantial up-front funding, but distribute the financial burden over time. --Focuses stakeholders and the public on next program phase.	--Requires legislative and voter approval. --Would require repeated approval over 30-year period. --Cannot be used for ongoing costs such as land management costs, monitoring and assessment
Water and power revenue bonds	--Can provide immediate sources of funding if linked to revenue-generating facilities. --Less burden on State budgets than general obligation bonds. Does not require voter or legislative approval. Linking beneficiaries to programs in SWP rates is consistent with beneficiary pay.	--Works well for private benefits (water deliveries and powers), but hasn't been used to cover programs with broad public benefits.
State appropriations	--Provides immediate sources of funding. --Focuses stakeholders and the public on next program phase. --Allows annual Legislative review	--A more direct financial burden than bonds. --Competition with other State programs. --Annual approval reduces assurance for long-term funding --Would require repeated approval over 30-year period.
Federal appropriations	--Provides immediate sources of funding. --Focuses high-level State and federal attention on the program. --Allows annual Congressional review	--Competition with other federal priorities. --Annual approval reduces assurance for long-term funding. --Would require repeated approval over 30-year period.
Private financing	--Can be more immediate than funding from public sources. --Some contributions have been made to solve regional problems, as well as local problems.	--Is generally focused on local needs.
Broad-based user fee	--Dependable and ongoing source of revenues (may fit with programs for ongoing funding needs). --Tied to diversion impacts on the Delta. --A broader-based fee would provide consistency and fairness with CVP users, who currently pay such fees. --Supported by stakeholder groups - Business Roundtable, etc.	--Since revenues come in annually, the funding available initially is less than with bonding or appropriations.

Stage 1 Projected Expenditures

CALFED has developed preliminary cost estimates for the Program for Stage 1. These costs are shown in the table below. Stage 1 costs are in current year dollars, and exclude interest, inflation, operation and maintenance, and program management costs. These estimates range in precision from specific project costs for conveyance improvements in the South Delta to broad programmatic level estimates of costs for water use efficiency. Additionally, CALFED's adaptive management approach makes long term cost estimating inherently difficult. However, the Stage 1 cost estimates do represent the right order of magnitude of investment which will be necessary to carry the program forward successfully.

CALFED Stage 1 Projected Expenditures ¹ (\$ in millions)	
Program Area	Total Cost
Ecosystem Restoration ^{2,3}	\$1,326
Water Use Efficiency/Recycling ⁴	\$2,956
Water Transfers ⁵	\$15
Watershed Management	\$300
Environmental Water Quality	\$280
Drinking Water Quality	\$675
Levees ⁶	\$444
Storage ⁷	\$1,425
Conveyance ³	\$747
Science Program ⁸	\$300
TOTAL	\$8,468
<p>Notes:</p> <p>¹ Preliminary; current year dollars based on staff estimates. Total costs assume contributions from State, Federal, and User/Private funding.</p> <p>² Funding includes \$50 million per year for the first four years for the Environmental Water Account.</p> <p>³ Cost estimates differ from Appendix A in "California Water Future: A Framework for Action" (June, 2000) because some actions which were considered complementary to CALFED were included in Appendix A, but are not included in this table.</p> <p>⁴ Actual expenditures will be determined after ongoing evaluation of effectiveness of program investments during the first four years of Stage 1.</p> <p>⁵ No major capital investments are necessary for this program.</p> <p>⁶ Total cost includes funding for the Suisun Marsh Levee Program, which provides substantial ecosystem, water quality, and flood control benefits.</p> <p>⁷ Storage expenditures include funding for groundwater and surface water planning and construction.</p> <p>⁸ Science Program will provide for implementation of adaptive management and more cost-effective decision-making throughout the rest of the Program.</p>	

4.4 Early Ecosystem Restoration

The December 15, 1994, Bay-Delta Accord included a commitment to develop and fund non-flow related ecosystem restoration activities to improve the health of the Bay-Delta ecosystem. This funding source and commitment is commonly referred to as Category III. The Category III Steering Committee was formed to administer the first rounds of Category III funding. In 1996, the administration function for Category III funds was shifted to the CALFED Bay-Delta Program's Restoration Coordination Program, which receives input from the Ecosystem Roundtable, the Bay-Delta Advisory Council (BDAC), and the general public. The Bay-Delta Advisory Council consists of over 30 representative California stakeholder groups. BDAC is chartered under the Federal Advisory Committee Act and provides input to the overall CALFED Program. The Ecosystem Roundtable is a subcommittee of BDAC specifically created to provide input from a broad cross-section of stakeholder interests to the Restoration Coordination Program.

To date, CALFED's Ecosystem Restoration Program has received more than 900 proposals and has funded 271 projects for a total of approximately \$250 million. The Program has funded fish screens, fish ladders, land acquisition, habitat restoration, and focused research and monitoring designed to provide information which will improve future restoration efforts. Funding sources have included contributions from the California Urban Water Agencies, Proposition 204 State bond funds, funding from the Federal Bay-Delta Act, and EPA watershed funding. For additional information on projects funded to date, visit the CALFED website at: <http://calfed.ca.gov> under the Ecosystem Restoration topic.

In 1999, the Restoration Coordination Program began the transition from early ecosystem restoration to implementation of the long-term Ecosystem Restoration Program. Once the Final Programmatic EIS/EIR is completed and the CALFED agencies make a decision on the CALFED Preferred Program Alternative, the agencies will begin full implementation of the long-term Ecosystem Restoration Program.

4.5 CALFED Science Program

Introduction

The CALFED Science Program includes implementation of the Comprehensive Monitoring, Assessment and Research Program (CMARP) as an integral aspect of the CALFED Program. The scope of the CALFED Science Program will include all elements of the program: ecosystem restoration, water supply reliability, water use efficiency and conservation, water quality, and levees. The purpose of the CALFED Science Program is to provide new information and scientific interpretations necessary to implement, monitor, and evaluate the success of the

CALFED Program. The CALFED Bay-Delta Program is organized around the concept of adaptive management because there is incomplete knowledge of how the ecosystem functions and the effects of individual project actions on populations and processes. Monitoring key system functions, completing focused research to obtain better understanding, and staging implementation based on information gained are all central to the adaptive management process. Actions are taken based on the best available information; results monitored and research performed in order to refine future actions or investments. This approach is dependent on credible and objective scientific review and evaluation to ensure that decisions are based on the best available, objective information. New information and scientific interpretations will be used to confirm or modify all aspects of the CALFED Science Program, including problem definitions, conceptual models, research, and implementation actions. The process necessarily includes numerous assessment and feedback loops so that management decisions are based on the best and most current information. This process entails an institutional framework to ensure that the correct questions are identified for monitoring and research actions, that monitoring and research are conducted appropriately, that the data collected and obtained are stored properly and available to those with an interest, and that relevant information is developed from the data obtained to further the incremental process of adaptive management.

Although the scope of the CALFED Science Program will address areas of uncertainty in all CALFED program elements, some program elements such as the Ecosystem Restoration Program (ERP) strongly rely on an adaptive management science program. In addition, the information from the CALFED Science Program will be available for use by other related State, Federal, local and nongovernmental actions/programs in the CALFED solution area. This includes other ecosystem restoration, water quality, levee and water management activities both regulatory and nonregulatory, including water project operations.

Status of the CALFED Science Program

A substantial monitoring effort in the Bay and Delta has been carried out for several years through the Interagency Ecological Program (IEP). The purpose of the CALFED Science Program is to build on the work of IEP and other efforts to assure that information gathering and evaluation necessary to the success of the CALFED Program is developed and carried out. The CALFED Science Program will help provide those new facts and scientific interpretations necessary for implementing the CALFED Program and for the public to judge the Program's success. Major efforts will include documenting and explaining the status and trends of the resources, providing timely information for real-time management, and participating in design, execution, and analysis of adaptive experiments. The CALFED Science Program must routinely make available information on major indicators of program progress. The CALFED Science Program efforts must be subjected periodically to independent scientific review to evaluate the Program's relevance and approach and to maintain public confidence in the Program.

The CALFED Science Program has made significant progress in recent years using early implementation of the ERP as its foundation. Agencies and stakeholders have participated in the development of ERP conceptual models, indicators of success, and the use of independent science review. All these ERP activities are critical components of a Science Program. CALFED is now expanding these activities to include the establishment and implementation of a Science Program for all areas of the CALFED Program, and for related activities.

In March 1999 a preliminary CMARP report was prepared and subsequently became a draft technical appendix of the Revised Draft Programmatic EIS/EIR in June 1999. The appendix includes preliminary information that has contributed to the development of a CALFED Science Program. This appendix has not been updated, and does not incorporate additional accomplishments relative to the development of a CALFED Science Program to date. In many cases, information on components and structure of a CALFED Science Program are preliminary and will continue to be refined as the Program moves to implementation.

The scope of the CALFED Science Program includes both institutional and environmental considerations. It seeks to balance specific knowledge needs of water managers and the public versus an understanding of ecosystem processes and what can actually be obtained and measured from the field. For example, CALFED agencies presently monitor the abundance of several key species and environmental attributes such as streamflow at the State and Federal diversion facilities in the Delta to understand better what is entrained, when, how many, during what life stage and under what kind of environmental conditions. Although much of this monitoring is designed to address institutional needs, limits on knowledge obtained are based on limitations of monitoring design which in turn are limited by the physical system to be monitored. Thus, the programmatic scope of the CALFED Science Program must consider both institutional needs and environmental considerations and should maintain sufficient flexibility to respond to both as they change over time.

CALFED has determined that monitoring, assessment, and research efforts are a critical component of the adaptive management process, and should be integral to all program elements. The application of the CALFED Science Program will be very different for individual CALFED programs. However, each program element has similar needs that include gathering and assessing data. In addition, the CALFED Science Program must also address the monitoring and assessment needs of the CALFED Multi Species Conservation Strategy, as well as any mitigation required as a result of CALFED program actions.

The CALFED Science Program will take into consideration the broad variety of factors that can affect the environment, its physical structure, chemical makeup and biotic communities. The recommended program will necessarily be limited to monitoring only a small fraction of the possible physical chemical, and biological, attributes of the environment. Conceptual modeling will play a key role in helping decide which attributes to monitor.

CALFED recognizes the need for reducing uncertainties about the factors affecting the resources of the Bay-Delta system. Although a traditional monitoring, assessment and research program will meet this need over a period of decades, CALFED needs to reduce key uncertainties at a more rapid rate to meet program goals. Therefore, CALFED will undertake an active program of adaptive resource management. Such a program will require a partnership between resources managers and scientists in which effects of key factors are better defined by informed management experiments. Resource managers will thereby increase chances of avoiding catastrophes and responding successfully to unexpected events. Informed adaptive experiments require policy-level recognition and acceptance of some risks to the resources.

In April 2000 the CALFED Management Group appointed a temporary Science Oversight Team (prior to the arrival of an interim science leader) to accomplish a set of tasks for the CALFED Science Program. These tasks include:

- Develop science questions associated with Stage I management decisions,
- Develop functions and structure of the CALFED Science Program,
- Draft revisions of the Programmatic EIS/EIR related to the CALFED Science Program,
- Develop initial lists of indicators and performance measures,
- Assess feasibility of a Bay-Delta science center,
- Develop coordination plans for science programs relevant to CALFED, and
- Clarify issues of implementing adaptive management in CALFED

The Science Oversight Team is currently responsible for overseeing the execution of these tasks in conjunction with other CALFED staff in all Program areas, CALFED agency staff, scientific advisors and stakeholders.

The rest of this section describes science related accomplishments and ongoing tasks, following the same organization as the CMARP Technical Appendix – goals and objectives, conceptual models, monitoring and research, data assessment and reporting, structure and function of the science program, and remaining implementation tasks. Many of these tasks are related to ecosystem restoration activities. It is anticipated that as other programs move into implementation that the CALFED Science Program will be expanded to meet the needs of all Program elements.

Goals and Objectives

Summary tables linking monitoring elements and indicators recommended by the CMARP Appendix to CALFED program objectives have been developed for all CALFED programs. These tables are accessible on the CMARP web page (<http://www.wiep.ca.gov/cmarp>), and the summary table for the ERP has been used to help create a terrestrial and amphibian baseline monitoring plan. The Science Oversight Team has begun an effort to describe specific scientific investigations and tasks needed to support management decisions by the end of Stage I. This information as it is developed and refined will provide the basis for setting priorities for scientific activities.

Conceptual Models

Many of the appendices of the CMARP appendix on monitoring/research topics contain conceptual models that were foundations for monitoring and research recommendations in Chapter 5 of the CMARP appendix. An additional need arose to develop conceptual models relevant to some of the key ecosystem restoration issues. These issues include fluvial geomorphology, riparian habitat and avifauna, tidal wetlands, aquatic contaminants, open water processes, salmonids, delta smelt, splittail, diversion effects on fish and the Environmental Water Account, and delta agricultural diversions. To meet this need, an ongoing process to document these issue-oriented conceptual models and their implications for restoration actions is being developed in a series of white papers. White paper authors are using the CMARP conceptual models to help develop the issue-oriented conceptual models. This process is described in more detail in the Strategic Plan for Ecosystem Restoration.

In addition, the ERP has begun requiring description and use of conceptual models in all proposed restoration projects (Ecosystem Restoration Projects and Programs, 2001 Proposal Solicitation Package). The models are intended to help project proponents explain the technical basis and assumptions underlying their proposed work, and to formulate testable hypotheses about project consequences.

Monitoring and Research

Activities in this category include work on a) baseline and ERP project monitoring programs, b) drinking water monitoring and research, and c) Stage 1 research questions.

a) Work is under way to identify the baseline monitoring needs for the ERP. The effort has been divided into two areas: aquatic monitoring (includes fish, aquatic invertebrates, hydrodynamics, fish habitat) and terrestrial and amphibian monitoring (includes birds, mammals, reptiles, amphibians, habitats, and the hydrologic and geomorphic processes that affect them). The purpose of these plans is to provide essential information on status and trends of important organisms and

their biological and physical habitats. Preliminary drafts of both of these plans have been assembled and will be available for review during early summer 2000. The terrestrial and amphibian monitoring effort will be conducting workshops with technical experts in summer, 2000 and expects to have a final report drafted by October, 2000. The aquatic monitoring effort expects to have a final report completed at an earlier date.

Protocols are being developed for data collected by ERP projects. These protocols are intended to ensure that project data are adequate to evaluate project performance and are compatible with data from other projects as necessary to evaluate overall program performance relative to baseline monitoring.

b) An organic carbon workshop was held in August 1999 and produced a workshop proceedings (Organic Carbon Drinking Water Quality Workshop Proceedings, CALFED Bay-Delta Program, October 9, 1999). The workshop was organized primarily to explore what is known about organic carbon sources, chemical qualities of the sources, and in-Delta transformations, and to identify monitoring and research needs. Nine speakers gave talks about organic carbon and drinking water issues and then the workshop participants discussed key issues and uncertainties. These proceedings provide useful information on organic carbon and drinking water.

c) The Science Oversight Team, in coordination with CALFED staff, CALFED agency staff and stakeholders is developing a list of Stage I management decisions and corresponding science questions that need to be addressed. As they are developed and refined, the science questions will be compared and reconciled with the recommendations in Chapter 5 of the CMARP appendix. Using these results, the CALFED Science Program will recommend focused research priorities for participating agency science programs and research proposal solicitations. This process also is expected to provide a clear rationale for activities that the Science Program undertakes and a management context in which to report science results.

Data Assessment and Reporting

CALFED is contracting with DWR to add data generated by ERP projects to an existing relational data base and browser system created for the Interagency Ecological Program (IEP), Central Valley Project Improvement Act Comprehensive Assessment Monitoring Program, and the Sacramento River Watershed Program. The project entails adding CALFED monitoring data as it becomes available into the relational data base and providing an already-created "data browser" and mapping interface for querying and displaying the data over the World Wide Web. This system will enable simultaneous queries and retrievals of data from all of these programs while allowing each data provider to retain control of its own data. It is anticipated that as other program elements move into implementation they will also make use of centralized data management.

The CALFED GIS Coordination Workgroup was formed in spring, 1999. CALFED's spatial analysis needs were summarized in a 6-page document based upon the CMARP Appendix and CALFED documents. A draft set of recommendations were prepared for the development of a GIS data layer for vegetation and other land cover within the CALFED Problem and ERP Focus Study areas to meet CALFED's vegetation spatial analysis needs. Some of these recommendations have been included in the Terrestrial and Amphibian Baseline Monitoring Program Report described above.

A CALFED Science Conference will be held on October 3-5, 2000 (see web page announcement at <http://iep.water.ca.gov/calfed/sciconf/>). The conference is being designed as a forum for presenting scientific information and ideas relevant to CALFED's goals and objectives in the San Francisco Bay, Delta, and watershed pertaining to ecosystem restoration, levee system integrity, and water quality. The conference program will feature a mix of plenary and contributed talks and poster presentations on topical themes relevant to CALFED. Conference organizers will write a management-oriented summary of the conference.

An effort was begun in November 1999 to develop an initial set of ecological indicators and performance measures for the ERP. It is anticipated that preliminary indicators and performance measures for all Program areas will be developed and refined as the Program moves into implementation.

Structure and Function of the Science Program

CALFED is seeking an interim science leader to precede a CALFED Chief Scientist. The interim science leader will be responsible for implementing the CALFED science program as a combination of coordinated agency science programs and a proposal solicitation process.

To meet its immediate needs the ERP has established an Interim Science Board (ISB) to provide the ERP with management-oriented scientific advice, review, and guidance. In addition, an Agency-Stakeholder Ecosystem Team (ASET) has been assembled to secure agency and stakeholder technical input. The ISB and ASET will work with CALFED staff and the broader agency/stakeholder community (e.g., the Ecosystem Roundtable) to help ensure that ERP implementation is based on sound science, employs an adaptive management strategy, and integrates with other relevant State and Federal programs. For more details, see the Strategic Plan for Ecosystem Restoration.

The Science Oversight Team in coordination with CALFED staff, CALFED agency staff, scientific advisors and stakeholders has started a process to develop the primary functions of the science program and how the program will be structured to perform its functions. The following describes the initial draft key functions of a CALFED Science Program. Additional information

on the functions and structure of the CALFED Science Program can be found in the governance chapter of the Implementation Plan.

Science Planning and Priorities

Develop broad science priorities to guide monitoring, research, and trial implementation actions. The priorities will support the scientific information needed to make management decisions during or at the end of Stage 1. Priorities and planning will be integrated across program elements, and developed with independent scientific review, agency and stakeholder input, and coordination among program managers. Priorities will be submitted to Policy Group or a CALFED commission for approval. Review and, if necessary, refine science based performance measures and indicators for each program on an ongoing basis to ensure the CALFED Program is effectively measuring and reporting on the program success.

Monitoring

Conduct monitoring to provide information to assess progress towards meeting goals and objectives of CALFED. Monitoring will be done at several levels:

- System-wide status and trends (baseline) of the Bay-Delta and watershed -- This monitoring helps identify long-term changes occurring as a result of human and natural factors.

- Regional level -- This monitoring helps identify changes occurring on a regional level as a result of human and natural factors. This monitoring will provide data to assess the achievement of regional objectives and targets.

- Individual projects and actions -- This monitoring helps determine if objectives of the project or action are being accomplished. This includes monitoring for enhancement actions and compliance monitoring as part of mitigation requirements. Monitoring for groups of similar projects/actions will be coordinated to provide information broader information on effectiveness of certain projects/ actions.

- Real-time monitoring for water project operations -- This near real-time monitoring of the presence of fish near the project pumps provides operators with data to adjust operations to protect fish and maintain water supply reliability.

Develop monitoring protocols for all types of monitoring to ensure data consistency for each category of project/action

Data Management.

Develop and maintain a public online coordinated and linked system for the monitoring data and other relevant data. The data in the database will be used for comprehensive analysis and reporting and will be available to agency and nonagency scientists. Data will be subject to quality assurance/quality control protocols. Data will be made available when needed for assessment and reporting requirements.

Assessment.

Perform data analysis and interpretation of the raw data generated in the monitoring programs in order to evaluate the overall performance of the CALFED Program. The data analysis and interpretation will be subject to independent peer review. Provide scientific judgements as necessary in order for decision-makers to make program decisions. The assessment will detect:

- System-wide trends of program indicators
- Regional level trends and responses of indicators
- Project level responses of indicators
- Real-time trends of indicators relevant to water operations

Research

Manage a focused research program that targets key scientific uncertainties related to program decisions. Research priorities will be based on the science priorities described above (Function #1). The purpose of the research program is to determine how consequences of actions happen, while the monitoring program describes what consequences happened. Gaining an understanding of how trends changed or why projects resulted in certain consequences is a critical element of the adaptive management process. Develop and refine conceptual biological and mathematical models that link important causes and effects.

Trial Implementation Actions (pilot and full scale).

Provide advice on the design and execution of trial implementation actions. A trial implementation action is one in which there is some level of uncertainty on the effects of the action, but the level of knowledge and information supports trial implementation. Trial actions are a partnership between science, management and the public. Trial actions will follow scientific principles and processes. Depending on the level of knowledge and information available, trial actions may be designed as pilot actions or full scale actions.

Data from the trial actions will be assessed and reported as part of the Science Program and adaptive management process.

Reporting

Disseminate scientific information, including opinions, data, models, and findings, to State and Federal agencies, scientific community, general public, stakeholders, and decision-makers. The scientific information will be converted to useful information for policy level interests and decision-makers and disseminated through published reports, scientific articles, briefings and conferences. Findings will be provided for all levels of monitoring (system-wide, project level and real-time) and from focused research. Reports should also be provided to regulatory agencies that summarize scientific knowledge for use in regulatory management decisions.

Coordination and Integration.

Coordinate science functions and actions performed between the CALFED program elements (ERP, Levees, Water quality, and water management). Coordinate with all other science programs (IEP, CAMP, SFEI) that are based in the Bay-Delta and its' watershed. When appropriate, existing science programs and the CALFED Science Program will be integrated to increase the usefulness of the data generated and reduce duplication. Coordinate with related programs (such as CVPIA actions, regulatory programs, water operations) to assure that related programs use the science information in their management decisions. Related programs should provide input into all functions of the Science Program to assure the use of the information by the related programs.

Independent Science Review

Provide independent science review for the scientific aspects of the CALFED Program and related programs, (including the overall CALFED program and individual programs such as the ERP, Environmental Water Account, and water project operations). Convene independent science panels and boards to advise in the development, implementation, and results of the Science Program. Obtain peer review of published findings. Independent science review is needed for evaluating the basic underlying assumptions and process of the CALFED Science Program as well as evaluating the success of the programs and actions. Independent science review is important to assuring quality and maintaining public confidence in the program

Implementation of the CALFED Science Program

The CALFED Science Program will continue to be developed and refined consistent with the evolving CALFED Program. A large number of tasks, many of which were recommended in the CMARP appendix, have been completed or are now under way: articulating goals and objectives, developing conceptual models for ecosystem restoration, developing baseline and project monitoring protocols and indicators, deriving a set of priority science questions for Stage I, developing data management and reporting tools, planning a CALFED science conference, recruiting an interim science leader, initiating the ISB-ASET process for ERP, and developing consensus on the functions and structure of the CALFED Science Program. A number of tasks remain, however, before the CALFED Science Program can be fully implemented. Stage 1 actions for the CALFED Science Program are identified in section 2.11. In addition to the specific actions contained in section 2.11, the following are concepts which will continue to be refined as part of the implementation of a CALFED Science Program:

- Adaptive management -- CALFED has embraced an adaptive management implementation strategy because of significant uncertainties about the consequences of program actions. Active adaptive management is designing and executing trial actions as scientific experiments to learn how the actions affect the resources. Despite its appeal, active adaptive management is infrequently employed because few scientists and managers have practical experience, and because trials often require agency and public acceptance of some short-term risks to the resources or the associated economy. A management-science-stakeholder partnership process is needed for designing adaptive experiments, gaining policy approval and public acceptance, and executing and learning from the experiments.
- Coordination plan for science programs related to CALFED -- Success of the CALFED Science Program depends in part on coordination among existing research and monitoring in the San Francisco Estuary and its watershed. The Science Oversight Team recently convened a meeting of principal investigators from several of the larger monitoring and research programs in the study area to solicit ideas on how to improve coordination and make information more readily available to managers. The attendees agreed that such meetings were useful and that the CALFED science conference and an annual written report to CALFED and other interested parties would help provide a degree of coordination not now present. The Science Oversight Team will follow up on these suggestions.
- Science center feasibility -- There is general consensus among technical staff that the establishment of a Bay-Delta science center has merit and should be developed as a cornerstone of the CALFED science program. A feasibility report on this activity will be completed and presented to the CALFED Management Group for their review and input.

4.6 Adaptive Management

No long term plan for management of a system as complex as the Bay-Delta can predict exactly how the system will respond to Program efforts or foresee events such as earthquakes, climate change, or the introduction of new species to the system. Adaptive management, as an essential Program concept, acknowledges that there is a need to constantly monitor the system and adapt the actions that are taken to restore ecological health and improve water management. These adaptations will be necessary as conditions change and as more is learned about the system and how it responds. The Program's objectives will remain fixed over time, but the actions may be adjusted to assure that the solution is durable.

The concept of adaptive management is an essential part of every CALFED Program element, as well. The concept of adaptive management can be illustrated as applied to the Ecosystem Restoration Program element as shown in the following section.

Because the Bay-Delta ecosystem is large, complex, diverse and variable, it is impossible to know with certainty how it will respond to implementation of the ERP and other Program components. And although much is known about how the Bay-Delta functions, there are still significant information gaps that hamper the ability to sufficiently define problems and design restoration actions to address them. To account for this uncertainty, the ERP strategic plan outlines an adaptive management approach to restoring and managing the Bay-Delta ecosystem. An adaptive management approach acknowledges the uncertainty inherent in restoring and managing a natural system as large and complex as the Bay-Delta by designing and monitoring restoration actions so that they improve the understanding of the system while simultaneously restoring it. This approach allows revised restoration activities or better designed future restoration actions based upon the information learned from projects implemented earlier. It also provides the flexibility required to respond to changing Bay-Delta conditions and to identify and address resource conflicts and trade-offs. The Strategic Plan outlines the following steps as part of the adaptive management approach:

1. **Define the problem or set of problems to be addressed.** In order to design effective restoration actions, the geographic, temporal, and ecological parameters of the problem must clearly be defined. Decades of scientific study have already identified many of the problems affecting the health of the Bay-Delta ecosystem. However, for certain components of the Bay-Delta ecosystem, existing knowledge is insufficient to adequately define problems, so targeted research will be necessary to provide the information that allows the problems to be defined with greater detail.

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2. **Define goals and objectives for resolving identified problems.** It is important to establish the expectations of the overall restoration program and for individual restoration actions by articulating clear restoration goals. It is also important to establish the criteria that can be used to measure success in achieving goals by defining measurable objectives. Clear goals and measurable objectives help focus and direct ecosystem restoration, they help facilitate the design of restoration actions, and they help resource managers track incremental progress toward restoration objectives.
 3. **Develop conceptual models.** It is impossible to account for all of the variables that compose and animate an ecosystem as large and complex as the Bay-Delta; therefore, it is necessary to distill the most important ecosystem attributes and relationships into simplified models that can guide resource restoration and management. Conceptual models articulate hypotheses about what attributes and relationships are most important in an ecosystem. By articulating hypotheses about causal relationships in the ecosystem, conceptual models can suggest potential restoration actions or identify critical information gaps that help target additional research.
 4. **Develop and design alternative restoration or management actions.** Conceptual models will provide an assessment of the confidence we can place in potential restoration actions. For those actions about which there is confidence in how the ecosystem will respond, full-scale implementation can begin. If conceptual models suggest multiple viable restoration alternatives, pilot or demonstration projects to test the alternative hypotheses could be implemented. The resulting information will improve understanding of the ecosystem and help suggest which restoration actions are most effective in achieving restoration goals. Conceptual models can also help identify information gaps and needed targeted research.
 5. **Implement restoration actions.** Restoration actions selected for implementation must address the more serious environmental problems, must be linked to conceptual models, and must provide an opportunity to enrich our knowledge of how the ecosystem operates.
 6. **Monitor the ecosystem.** It is important to monitor the ecosystem to gauge how it responds to the restoration or management action. Monitoring provides the information necessary for assessing the effectiveness of a given restoration action. It also provides the data that will help improve understanding of the Bay-Delta ecosystem.

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7. **Update restoration and management actions.** The information derived from monitoring data allows resource managers to evaluate restoration actions and revise or update them to be more effective in achieving restoration goals and objectives. Monitoring data can also indicate when there is a need to refine the definition of a problem or the goals and objectives.

Similar models of these seven steps can be used to develop adaptive management approaches for the other program elements.